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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/882,027	06/18/2001	Ki Seon Kim	2832-0137P	8803

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BIRCH STEWART KOLASCH & BIRCH
PO BOX 747
FALLS CHURCH, VA 22040-0747

EXAMINER	
PERILLA, JASON M	

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 02/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/882,027	KIM ET AL.	
	Examiner	Art Unit	
	Jason M Perilla	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 June 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-9* is/are rejected.

7)☒ Claim(s) *3* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-9 are pending in the instant application.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

3. Claims 1-9 are objected to because of the following informalities:

Regarding claim 1, it is suggested by the Examiner that, to conform with the generally accepted terminology of the art and to maintain definite claim language, "receiving" is replaced by –received—in each instance of each claim. Furthermore, to maintain definite claim language and properly embody the invention, "modulate" should be replaced by –demodulate—in each instance of each claim. The acronyms OFDM (line 1), PLL (line 2), S/P (line 6) and P/S (line 12) should be defined in the claim as "orthogonal frequency division multiplex", "phase locked loop", "serial to parallel" and "parallel to serial", respectively.

Regarding claim 2, in lines 3-4, it is suggested that "removing frequency offset of external receiving signals" is replaced by –removing a frequency offset of externally received signals—for clarity and definiteness of the claim language. In lines 12-13, it is suggested that "with phase difference" is replaced by –with a phase shift—to properly embody the invention. The acronyms A/D (line 6), D/A (line 14), and VCO (line 18) should be defined in the claim as "analog to digital", "digital to analog", and "voltage controlled oscillator", respectively.

Regarding claim 3, in line 6, it is suggested that "available data and" is replaced by –available data corresponding to an I-1st symbol and--, and, in line 11, "data" is replaced by --data corresponding to an Ith symbol—to make the claim language definite. Further, the claim is objected to for not properly embodying the invention. That is, on page 12 of the specification in conjunction with figure 4 of the drawings, the first resultant value is formed by multiplying data of a protection period of an I-1st symbol by actual data of an I-1st symbol. Moreover, any addition used for the generation of the first resultant value is applied between the results from several consecutive protection period data values *multiplied* to their corresponding actual data values of the symbol (see figure 4).

Regarding claim 4, in line 1, OFDM should be defined as "orthogonal frequency division multiplex".

Regarding claim 5, the claim is objected to for not properly embodying the invention. That is, on page 12 of the specification in conjunction with figure 4 of the drawings, the error signal is formed by multiplying data of a protection period by actual data. Moreover, any addition used for the generation of the first resultant value is applied between the results from several consecutive protection period data values *multiplied* to their corresponding actual data values of the symbol (see figure 4).

Regarding claim 7, the claim is objected to because the variable I is not defined in the claim (Line 4: $\gamma_{I\text{-}m,N\text{-}l}$ X $\gamma^{*}_{I\text{-}m,\text{-}l}$). The complex conjugate (γ^{*}) is not defined in the claim. In line 6, "the L data" is lacking antecedent basis.

Regarding claim 8, the claim is objected to because the variable of the form $\gamma_{,b}$ is not defined although it is used in the claim. The form $\gamma_{a,b}$ is defined in dependent claim 7, however, the form $\gamma_{,b}$ is not defined. Further, the objections to claim 7 above are inherited into claim 8.

Claim 9 is objected to for the same reasons as applied to claim 7 above.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 4-9 are generally narrative and indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with idiomatic errors. The idiomatic errors in the claims cause the claims to be indefinite as applied below.

6. Claims 4-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 4, the claim is indefinite because one skilled in the art is unable to determine the scope and definition of the limitations. For instance, "each unit of symbol" in lines 4-5 is indefinite. The synchronizing of the receiving signals is not definite because there is no reference to synchronize to. That is, one skilled in the art requires a reference point for synchronization for the claim to be definite. Finally,

"modulating amplitude and phase" is inconsistent with a method of receiving and "modulating ... to process the modulated signals" is indefinite because it is counterintuitive.

Regarding claim 5, in line 2, "the protection period" is lacking antecedent basis, and, in line 4, "the actual data" is lacking antecedent basis making the claim indefinite. Further, the shift from "signals" to "data" makes the claim indefinite. One skilled in the art in unable to clearly determine the relationship between the signals and the data.

Regarding claim 6, in lines 3-4 and 6-7, "multiplying and adding" and "by and to" do not clearly and definitely follow an order of operations and it makes the claim indefinite. One skilled in the art is unable to determine the order of the multiplying and the adding such that one definite interpretation may be made.

Claim 8 is indefinite because it defines an expression for the generated error signals although it depends upon claim 7 which also defines an expression for the generated error signals. One skilled in the art is unable to determine which of the two expressions is to be utilized to determine the error signals.

Claim 9 is indefinite because it defines an expression for the generated error signals although it depends upon claim 7 which also defines an expression for the generated error signals. One skilled in the art is unable to determine which of the two expressions is to be utilized to determine the error signals.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 1, 2, 4, and 5 are rejected under 35 U.S.C. 102(a) as being anticipated by the applicant's admitted prior art (AAPA).

Regarding claim 1, the AAPA discloses according to figure 1 a signal receiver of an OFDM system comprising: a PLL (1) for generating error signals (output of 1c) using successive data among receiving signals (page 4, lines 1-20) of a symbol unit and synchronizing the receiving signals in accordance with the error signals; an S/P converter (2) for converting the synchronized signals to parallel signals; a Fourier transform unit (3) for fast Fourier transforming the converted parallel signals; a signal modulation unit (4) for modulating amplitude and phase of the Fourier transformed signals; and a P/S converter (5) for converting the modulated signals to serial signals. The receiver according to figure 1 of the AAPA synchronizes the received signals according to the error signals because the error signals effect the carrier frequency generated by the VCO (1f) used to downconvert the received signal as illustrated.

Regarding claim 2, the AAPA discloses the limitations of claim 1 as applied above. Further, the AAPA discloses according to figure 1 that the PLL includes: a multiplexer (1a) for removing frequency offset of external receiving signals in accordance with the generated error signals; an A/D (1b) converter for converting the signals, in which the frequency offset is removed through the multiplexer, to digital signals and outputting the converted digital signals to the S/P converter; an error detector (1c) for adding the successive data of the receiving signals output through the

A/D converter to generate the error signals in accordance with phase difference of the receiving signals; a D/A (1d) converter for converting the error signals generated by the error detector to analog signals; a loop filter (1e) for converting the analog signals converted through the D/A converter to direct current (DC); and, a VCO (1f) for synchronizing the error signals in accordance with the DC converted through the loop filter to remove the frequency offset of the receiving signals in the multiplexer and at the same time synchronize the receiving signals.

Regarding claim 4, the AAPA discloses by figure 1 a method for receiving signals of an OFDM system comprising the steps of: a) generating error signals (1c) using successive data (page 4, lines 1-20) among receiving signals of the OFDM system for each unit of symbol; b) removing frequency offset (1a and 1f) of the receiving signals in accordance with the generated error signals and synchronizing the receiving signals; and c) modulating amplitude and phase (4) of the synchronized receiving signals to process the modulated signals in the OFDM system.

Regarding claim 5, the AAPA discloses the limitations of claim 4 as applied above. Further, the AAPA discloses that step a) includes the steps of extracting signals of the protection period from the receiving signals and multiplying successive data of the protection period to the actual available data to generate the error signals (page 4, lines 1-20).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 4, and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Daffara et al (US 5687165; hereafter "Daffara").

Regarding claim 1, Daffara discloses by figure 4 a signal receiver of an OFDM system comprising: a PLL (116) for generating error signals (ε) using successive data among receiving signals of a symbol unit (col. 4, line 36 – col. 5, line 5) and synchronizing (col. 4, lines 29-35) the receiving signals in accordance with the error signals; an S/P converter (154) for converting the synchronized signals to parallel signals; a Fourier transform unit (153) for fast Fourier transforming the converted parallel signals; and a P/S converter (155) for converting the modulated signals to serial signals. Daffara does not explicitly disclose a signal demodulation unit for demodulating the amplitude and phase of the Fourier transformed signals. However, the demodulation of the received signals is implied and obvious in view of the disclosure of Daffara. For instance, figure 1 illustrates a demodulation block (113) in the receiver as expected by one having skill in the art. In figure 4, the demodulator (113) is embodied by the serial to parallel converter (154), the FFT block (153) and the parallel to serial converter (155). It is disclosed that the demodulation of the OFDM signals occurs in the "DEMOD" block 113 as illustrated (col. 3, lines 60-65), and one skilled in the art acknowledges that the demodulation of the OFDM signals would occur in the DEMOD block to provide utility for the receiver. Therefore, although not explicitly disclosed, it would have been obvious to one having ordinary skill in the art at the time

which the invention was made that a demodulation of amplitude and phase occurs between the FFT block and the P/S block such that the data could be recovered from the received signals.

Regarding claim 4, Daffara discloses by figure 4 a method for receiving signals of an OFDM system comprising the steps of: a) generating error signals (ε) using successive data among receiving signals of the OFDM system for each unit of symbol (col. 4, line 36 – col. 5, line 5); b) removing frequency offset (117) of the receiving signals in accordance with the generated error signals (via feedback PLL 116) and synchronizing the receiving signals (col. 4, lines 29-35); and c) modulating amplitude and phase of the synchronized receiving signals to process the modulated signals in the OFDM system (fig. 1, ref. 113; col. 1, lines 55-65).

Regarding claim 5, Daffara discloses the limitations of claim 4 as applied above. Further, Daffara discloses that step a) includes the steps of extracting signals of the protection period from the receiving signals and adding successive data of the protection period to the actual available data to generate the error signals (fig. 5; col. 4, line 36 – col. 5, line 5).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior art not relied upon above is cited to further show the state of the art with respect to OFDM synchronization.

U.S. Pat. No. 5812533 to Cox et al.

U.S. Pat. No. 5608764 to Sugita et al.

U.S. Pat. No. 5602835 to Seki et al.

U.S. Pat. No. 6151295 to Ma et al.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (571) 272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason M. Perilla
February 14, 2005

jmp

CHIEH M. FAN
PRIMARY EXAMINER